

REMARKS

Reconsideration of this application, as amended, is requested.

Claims 1-12 remain in the application. The claims have been amended to define the invention more clearly.

The Examiner objected to the figures and required the figures to be identified as prior art.

A replacement sheet is attached. Both figures have been identified as prior art.

The Examiner objected to the specification and required a new abstract that conforms to the requirements of the United States Patent and Trademark Office.

A substitute abstract is attached.

The Examiner raised several formal objections to the specification and required a substitute specification.

This amendment is submitted concurrently with a marked up version of the original specification to show changes that will ensure that the specification reads more clearly. A clean version also is attached and incorporates the marked changes. The undersigned attorney for the applicant hereby declares that the substitute specification includes no new matter.

Claims 1-12 were rejected under 35 USC 103(a) as being obvious over Guido et al., U.S. Patent No. 4,881,763.

The Guido et al. reference relates to molding a pipe made of steel of cold worked hardness (i.e. DIN 2391). This molding is carried out by upsetting to form a compression nipple on the pipe without a preliminary soft annealing. The nipple then is

subjected to soft annealing. The texture of the main body pipe is a ferrite texture formed by cold plastic deformation. The texture of the portion where the soft annealing is performed (i.e. the nipple) is a particle recrystallized texture. The Guido et al. reference employs a high carbon steel of .25%C and above. The Guido et al. reference is intended to cut down on annealing costs, reduce the risk of surface contamination during annealing and increase reusability by only softening the sealing surface of the nipple.

This amendment is submitted with an Information Disclosure Statement. The Information Disclosure Statement includes a copy of Form PTO-1449 that identifies a nonpatent publication entitled Seamless Precision Steel Tube DIN 2391. This reference defines a standard for the ST30A1 steel of Guido et al. The reference may help the Examiner understand differences between TRIP steel and the steel referenced in Guido et al.

In contrast, the invention defined by the amended claims is directed to a pipe formed of TRIP steel manufactured by performing pipe extension and heat treatment for depositing residual austenite. After the final pipe extension, the pipe then is subjected to molding to form the head portion and is subject bend processing without performing a final annealing after the head is formed. TRIP steel is defined in detail in the application and is clearly different from the DIN 2391 steel tube of Guido et al. The use of TRIP steel, as claimed, results in enhanced strength and permits simple manufacturing, as explained in the application.

With respect to claim 3, a pipe of TRIP steel is finished by a final pipe extension process. The pipe then is heat treated for depositing residual austenite. The

head then is molded and the bending process is performed. The inner surface layer of the pipe body then is processed plastically so that a martensite transformation is reduced. The Guido et al. reference has no suggestion of this aspect of the invention. The Guido et al. reference also has no suggestion of the features of the invention set forth in the dependent claim 2 or any of claims 4-12.

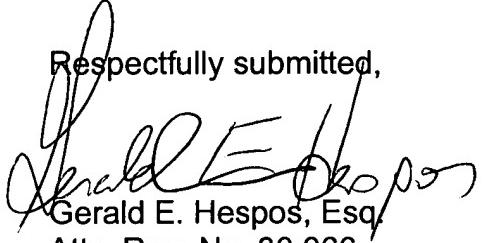
There is a significant difference between the claimed invention and the Guido et al. reference with respect to hardness. In particular, hardness in Guido et al. relates to processing/hardening of normal steel. In particular, plastic deformation is produced when dislocation on a slip surface of crystallized texture of steel (lattice defect) or dislocation formed by processing moves on the slip surface. Density of dislocations increases during the plastic deformation through several structures. They then entwine and interfere with each other and lose mobility or harden.

In contrast, hardness achieved by the claimed invention relates to hardening by depositing process-induced martensite of transformation of the TRIP steel. In particular, austenite is produced by high temperature during heat treatment performed on steel of the specified and claimed components. Pipe extension processing is performed on a steel, and the steel retains the austenite. Residual austenite is included as a part of a dual-phase-steel, bainite steel etc. Processing makes residual austenite more plastic transformable and it becomes a process induced martensite and hardens. The claimed use of TRIP steel achieves higher deformational stability or workability, such as elongation, through transformation of residual austenite. Productivity increases due to a higher reduction rate of the extended pipe section. Thus, fewer extensions are required for any selected extension amount. The martensite

provides a texture of superior harness achieve by transforming residual austenite into process induced martensite.

In view of the preceding amendments and remarks, it is submitted that the claims are directed to patentable subject matter and allowance is solicited. The Examiner is urged to contact applicant's attorney at the number below to expedite the prosecution of this application.

Respectfully submitted,



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